

What is claimed is:

1. A unitary retaining ring for use in a Chemical Mechanical Polishing (CMP) apparatus comprising:

5 a pad engaging surface which is designed to be flat and planar when the retaining ring is mounted to a carrier of the CMP apparatus;

a carrier engaging surface located opposite the pad engaging surface; and,

a plurality of mounting features located along the carrier engaging surface, the mounting features being installed to cause localized compressive stress in the retaining ring

10 when in a de-mounted state;

whereby upon mounting to a carrier under specified torque or force conditions, tensile stresses are applied to the retaining ring in the vicinity of the localized compressive stress resulting in a flat and planar mounted pad engaging surface.

15 2. The unitary retaining ring of claim 1 wherein the plurality of mounting features include reinforcing members mounted within holes on the carrier engaging surface whereby the localized compressive stress is caused by the fit between the reinforcing member and the hole.

3. The unitary retaining ring of claim 2 further comprising channels being formed in
20 the pad engaging surface extending from an inner surface to an outer surface of the ring.

4. The unitary retaining ring of claim 3 wherein the channels are formed to have an arcuate profile.

5. The unitary retaining ring of claim 1 further comprising an annular ridge formed along a periphery of the carrier engaging surface.

5 6. The unitary retaining ring of claim 5 further comprising a first ledge extending inward from the annular ridge.

7. The unitary retaining ring of claim 6 further comprising an intermediate surface extending inward from the first ledge.

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8. The unitary retaining ring of claim 7 further comprising a second ledge extending inward from the intermediate surface.

9. A method of making a unitary retaining ring for use in a Chemical Mechanical
15 Polishing (CMP) apparatus comprising the steps of:

forming a ring from a cylindrical or tubular material;

machining inside and outside diameter dimensions to form inner and outer
surfaces on the ring;

machining a planar carrier engaging surface between the inner and outer surfaces;

20 forming a plurality of mounting features on the carrier engaging surface in a
manner causing a localized compressive stress in the area surrounding the mounting feature;

mounting the retaining ring to a fixture which simulates the mount of a CMP
apparatus;

machining a flat pad engaging surface between the inner and outer surfaces
opposite the carrier engaging surface; and,
dismounting the ring from the fixture.

5 10. The method of claim 9 wherein the mounting features are formed by first drilling
holes into the carrier engaging surface and then inserting a reinforcing member in each hole.

 11. The method of claim 10 wherein the retaining ring is mounted to the fixture by
fasteners passing through holes in the fixture and secured to the reinforcing members of the
10 mounting features causing a localized tensile stress in the ring.